

REMARKS

This request for reconsideration responds to the Official Action dated July 16, 2010. Claims 38 and 39 have been withdrawn and Claims 21-37 have been rejected over the prior art. Favorable reconsideration of this application in view of the following remarks is respectfully requested.

Priority

Applicants wish to thank the Office for acknowledgement of the claim for foreign priority based on French application FR 03/05165, filed April 28, 2003.

A certified copy of the French application has been requested and is forthcoming.

Rejections under 35 U.S.C. §102

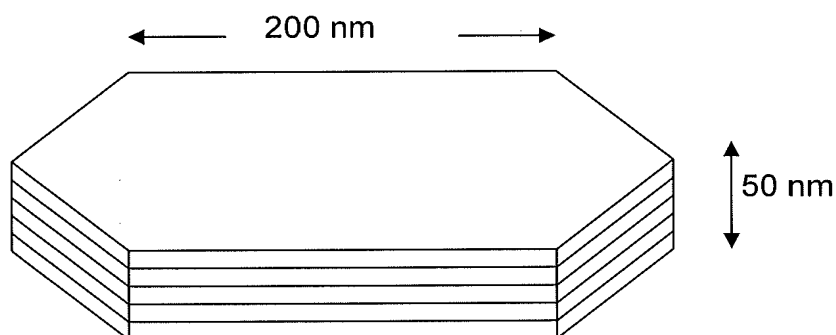
The Official Action rejected Claims 21-37 under 35 U.S.C. §102(b) as allegedly anticipated by WO 02/16264 to Bougelot et al. ("Bougelot") (see equivalent U.S. Patent Application Publication No. 2004/0033186).

Specifically, the Official Action alleges that:

Regarding claims 21-25, '186 discloses compositions comprising a lamellar compound based on zirconium and/or titanium phosphate (para. [0049]). The composition also comprises a macromolecular material having thermoplastic nature (para. [0050]). The zirconium phosphate compound is embodied by particles having lamellar structure, wherein the lamellae have size between 200 and 500 nm (para. [0105]). The particles are composed of composed stacks, wherein the thickness of the stacks along the direction perpendicular to the platelets is approximately 200 nm (para. [0105]). This data yields particles having aspect ratio between about 1 and 2.5. The prior art effectively discloses an aspect ratio range which encompasses all the particles, i.e. 100%

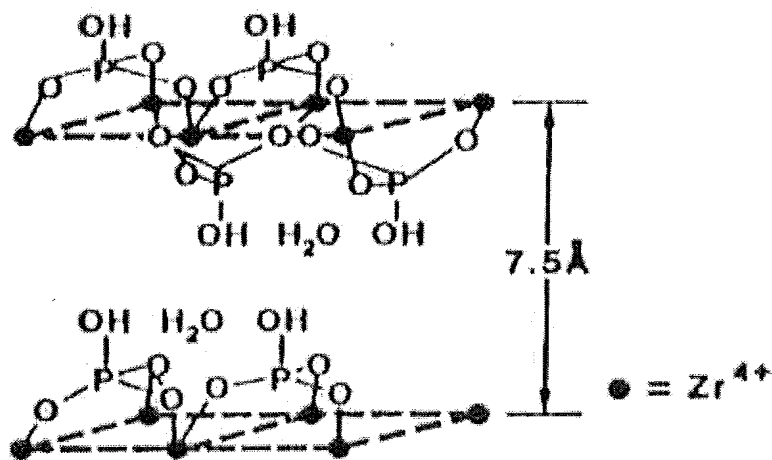
of the particles have aspect ratio between about 1 and 2.5. It is also noted that the zirconium phosphate particles are formed via a method substantially identical to the method disclosed on pages 12 and 13 of the instant specification. Accordingly, the limitations of instant claims 21-25 are met. (Official Action at page 3).

The present invention is directed to a composition comprising a thermoplastic matrix in which at least 50% by number of ZrP particles are in the form of nanometric lamellar stacks exhibiting an aspect ratio of less than or equal to 100. Such stacks correspond to an assembly of lamellas. Exhibit A, reproduced below, represents a stack as an assembly of lamellas.



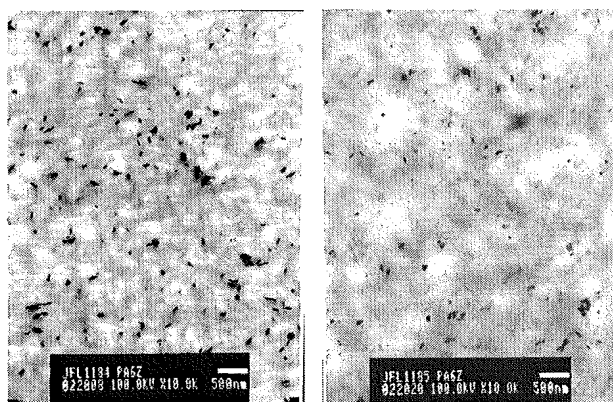
As shown, the stack exhibits an aspect ratio of $200/50 = 4$. Each lamella of the stack usually exhibits a thickness of 1 nm. Thus, if delaminating occurs, each lamella will exhibit an aspect ratio of $200/1 = 200$. Thus, there is a difference between aspect ratios of stacks and exfoliated lamellas.

Exhibit B, reproduced below corresponds to crystalline structure of ZrP.



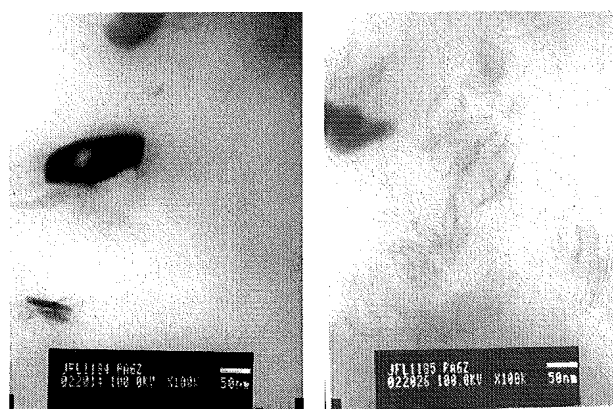
Inter-layers have a distance of approximately 7.5 Å. Within this interstice, exfoliating agents, such as HMD, will act and lead an exfoliation of the stack to obtain the individual lamellas in the polyamide matrix. ZrP structure can exchange protons for cations (e.g., Na⁺, K⁺, NH₄⁺, Li⁺, etc.) or other organic compounds (e.g., HMD, amino acid, etc.).

Exhibit C, reproduced below, shows several electron microscope pictures after polymerization of the polyamide in the presence of 2% weight of ZrP and exfoliating agent (B1 & B2) or in absence of exfoliating agent (A1 & A2).



A1

B1

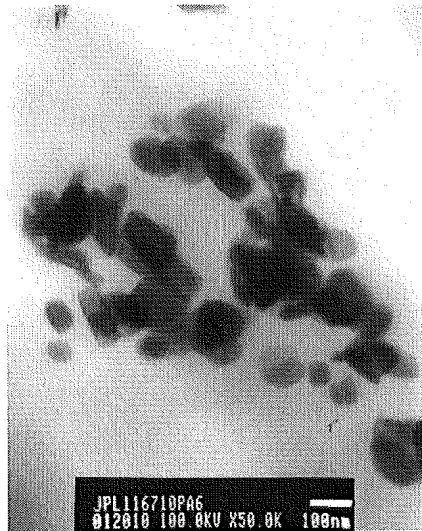
*Scale 500 nm**Without exfoliating
agent**With exfoliating
agent**Scale 50 nm*

A2

B2

As shown in A1 and more precisely in A2, without exfoliating agent there is no exfoliation occurring. As shown in B1 and B2, with an exfoliating agent there is a complete or near complete exfoliation of stacks. In this case, only individual lamellas are observed.

Finally, as shown in Exhibit D, reproduced below, and corresponding to A1 above with a scale of 100 nm, it can be observed that there is no individual lamella and that ZrP remains as stacks.



According to the experimental part of the present invention, granules B were made by the use of non-intercalated ZrP and comprise at least 50% by number of stack (lamellar non-exfoliated form) providing an aspect ratio of less than or equal to 100. This means that the initial lamellar compound (i.e. the stack of several lamellae), which is introduced to the thermoplastic matrix remains in the form of a multi-lamellar compound in the final composition. By contrast, granules A were made by the use of HMD intercalated ZrP that led to an exfoliation of lamellas in the polyamide matrix and then an aspect ratio higher than 100 for the majority of particles. Granules A are comparative granules in which HMD acted for intercalation of ZrP stacks and permitted the delaminating and then the achievement of a high aspect ratio within the thermoplastic matrix.

Claim 21 recites a composition comprising at least one thermoplastic matrix and particles based on zirconium, titanium, cerium and/or silicon phosphate, wherein at least 50% by number of the particles are in the form of nanometric lamellar compounds exhibiting an aspect ratio of less than or equal to 100.

To anticipate a claim, the applied reference must disclose all features of the claim. In addition, "unless a reference discloses within the four corners of the document not only all of the limitations claimed but also all of the limitations arranged or combined in the same way as recited in the claim, it cannot be said to prove prior invention of the thing claimed and, thus, cannot anticipate under 35 U.S.C. §102" (Emphasis Added). *Net Money/N, Inc. v. Verisign, Inc.*, 545 F.3d 1359 (Fed. Cir. 2008).

In this case, Claim 21 is not anticipated by Bougelot because Bougelot fails to disclose at least 50% by number of the particles are in the form of nanometric lamellar compounds exhibiting an aspect ratio of less than or equal to 100 as recited in Claim 21 and disclosed in the specification. Instead, Bougelot discloses the treatment of ZrP lamellar compounds with an organic compound of formula (I) such as HMD, and permitting to proceed to exfoliation of the lamellar compound into individual lamellas in order to increase the mechanical properties of thermoplastic compositions. Stacks used at the start of the process provide a low aspect ratio (paragraph [0105]), but once polymerization occurs, individual lamellas are obtained into the polyamide matrix due to the exfoliation step. As discussed in paragraph [0117], such compositions show the presence of a great many dispersed inorganic lamellae of nanometer thickness (about 1 nm) and with a width of 50 to 100 nm. Thus, the aspect ratio is then roughly $200 \text{ to } 500 \text{ nm} / 1 \text{ nm} = 200 \text{ to } 500$, and Bougelot's claimed final formulation fails to show a majority amount of nanometric lamellar stacks exhibiting an aspect ratio of less than or equal to 100.

Moreover, Bougelot focuses on ways to obtain exfoliation of the stack in the final polymeric composition. In contrast, the present specification focuses on obtaining good fluid barrier properties without proceeding to such an exfoliation of

particles without a preliminary treatment. This effect is discussed in the experimental data in comparison with other exfoliated particles (See Tables 3, 4 and 5), and such effect could not be attended by a person skilled in the art with the knowledge of Bougelot.

As Bougelot fails to disclose all features of Claim 21, Claim 21 is not anticipated by Bougelot. Claims 22-37, which ultimately depend from Claim 21, are also not anticipated for at least the reasons Claim 21 is not anticipated.

Double Patenting Rejection

The Official Action rejected Claims 21-32 on the ground of nonstatutory obviousness-type double patenting as being unpatentable over Claims 1-5 of U.S. Patent No. 7,238,738 to Dupuy et al. ("Dupuy").

As Dupuy is directed to a composition comprising exfoliated ZrP under lamellas form and not a stack as in the present invention. The material includes a thermoplastic matrix and a nanoparticulate compound based on zirconium and/or titanium phosphate exhibiting individual leaves with an aspect ratio of equal to or greater than 250. As such, Applicants respectfully request reconsideration of this rejection.

Furthermore, as this rejection of Claims 21-32 may be overcome by filing a Terminal Disclaimer, Applicants will consider submitting a Terminal Disclaimer upon the indication of allowable subject matter in this Application if a Terminal Disclaimer is still needed.

The Official Action further alleges that Claims 21-32 are directed to an invention not patentably distinct from claims 1-5 of commonly assigned U.S. Patent

No. 7,238,738 to Dupuy et al. ("Dupuy"). As such, the Official Action notes that the assignee can, under 35 U.S.C. 103(c) and 37 C.F.R. 1.78(c), either show that the conflicting inventions were commonly owned at the time the invention in this application was made, or name the prior inventor of the conflicting subject matter.

As noted above, it is not believed that subject matter is conflicting.

Conclusion

In view of the foregoing, it is submitted that all claims are in condition for allowance. Should any questions arise in connection with this application or should the Examiner believe that a telephone conference with the undersigned would be helpful in resolving any remaining issues pertaining to this application, the undersigned respectfully requests that she be contacted at the number indicated below.

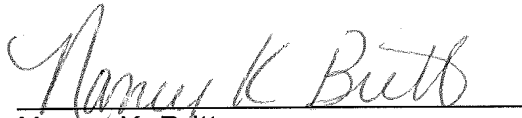
The Director is hereby authorized to charge any appropriate fees under 37 C.F.R. §§ 1.16, 1.17 and 1.20(d) and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: November 16, 2010

By:


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